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# Why Effective Pain Management Remains a Challenge

*Nnenna Ugwu*

## Abstract

Pain is a subjective expression of neural impulses induced by a stimulus with a capacity to potentially damage tissues of the body. Simply put, pain is the reaction of the body to a potentially noxious or noxious stimulus, which threatens the normal homeostasis if unrelieved. Pain can be managed via pharmacological and non-pharmacological means, and pharmacological agents are the most widely accepted means, which have been shown to have variable effectiveness against pain. The barriers to effective pharmacological pain management in clinical practice are discussed in this chapter.

**Keywords:** analgesics, challenges, pain, pain management, pharmacological agent

## 1. Introduction

Despite the consistent scientific interest in pain research and pain management, pain has continued to remain an obstacle which threatens the welfare of patients. The challenging nature of pain has been extensively reported by clinicians and researchers [1–4]. Adequate pain relief is hardly achieved even when pain appears to be the most usually presented symptom by patients in the emergency department [5–8]. Pain accounts for over 40% of all the primary complaints in the emergency department [9], with a greater proportion of these patients reporting moderate to severe degree of acute pain [10]. Considering these reports, it would seem normal to assume that the institution of pain management would be prompt and effective. However, reports across all treatment settings indicate that adequate pain management is hardly achieved, and most patients continue to experience pain despite the institution of pain management strategies. For instance, nearly half of 71 patients and 74% of 842 patients presenting moderate to severe degree of acute pain complained of pain of similar intensity at discharge from the emergency department [7, 11]. The observations from the postoperative setting are also similar to that of the emergency department. Most surgical patients also reported a higher degree of intense acute pain following surgery, with over 73 million surgeries performed annually in the United States [12]. Additionally, 82% of 250 surgical patients expressed pain from the immediate postoperative period until 2 weeks post-discharge, and 86% of these patients experienced moderate to severe degree of pain [12]. Pain was also incriminated in most patient surveys and complaints to health services [13]. It is therefore clear that achieving optimal pain management is still a key issue across treatment settings even though pain is a manageable condition and effective pain management is possible as evidenced in experimental literature.

## **2. Concept of pain**

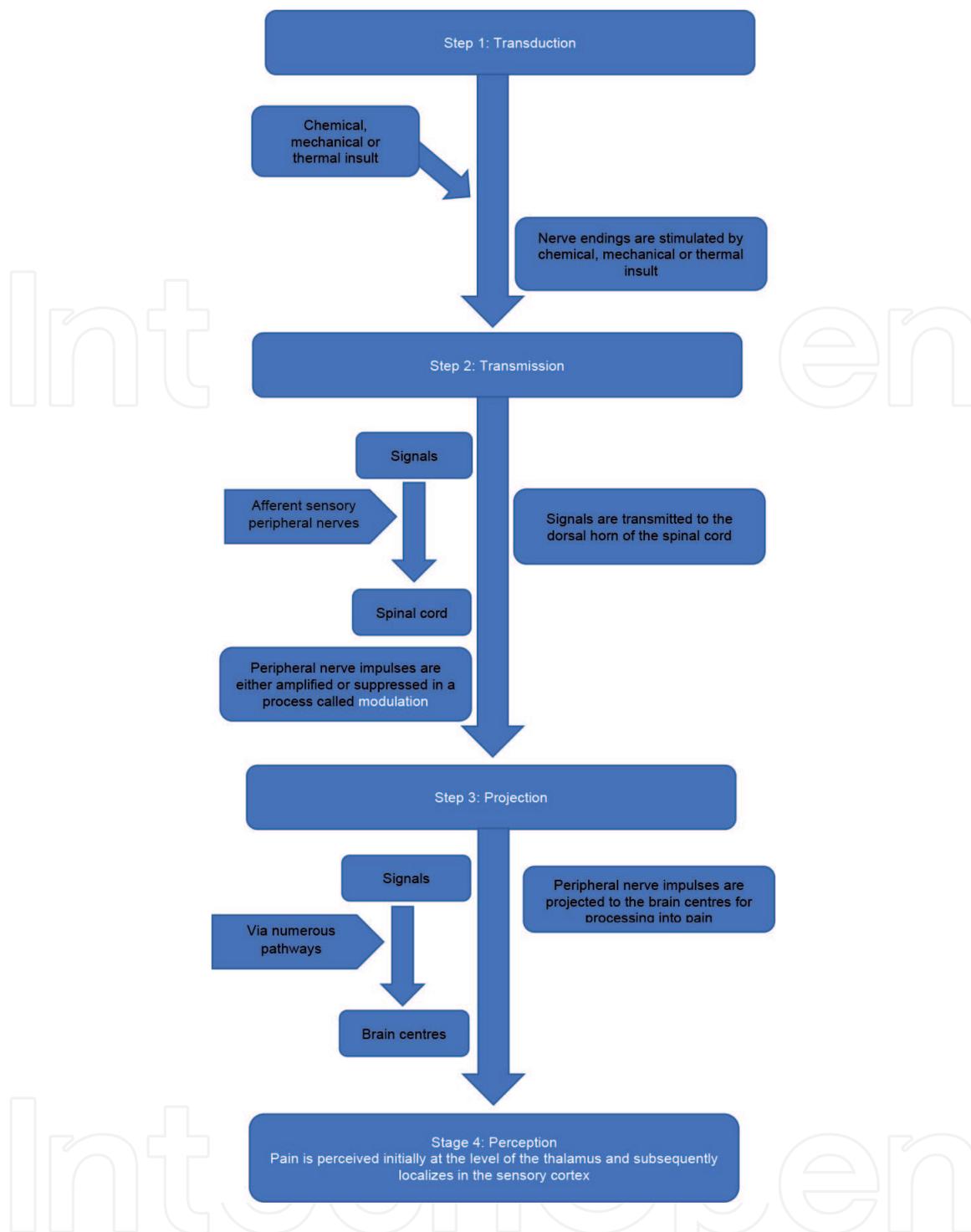
An accurate understanding and definition of pain and related terms is fundamental to effective pain recognition, quantification, and mitigation. Pain is generally a difficult term to define. This is because pain is seen as a subjective experience with variable effects on patients [14] and as a complex phenomenon with sensory cognitive and emotional components [15]. Pain was defined by the International Association for the Study of Pain Subcommittee on Taxonomy as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage” [16]. However, this definition was recently refined. Thus, the most recent definition of pain by the International Association for the Study of Pain Subcommittee on Taxonomy described pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [17]. To the author’s understanding, pain is a subjective expression of neural impulses induced by a stimulus with a capacity to potentially damage tissues of the body. In other words, pain is the reaction of the body to a potentially noxious or noxious stimulus and threatens the normal homeostasis if unrelieved.

### **2.1 The pain pathway**

Essentially, the pain pathway comprises of four major steps, including transduction, transmission, projection, and perception, all working together to achieve the awareness or sensation of pain as shown in **Figure 1**. Pain begins with the stimulation of specialized nerve endings (nociceptors) by chemical, mechanical, or thermal insult in a process termed transduction, followed by the transmission of these signals to the spinal cord (dorsal horn) via afferent peripheral sensory nerves. The afferent peripheral sensory nerves are composed of two major types, the myelinated A delta and unmyelinated C fibers, whose cell bodies reside in the spinal cord. The myelinated A delta fibers are known to be localized and fast conducting, while the unmyelinated C fibers conduct slowly but are more diffuse. The resulting peripheral nerve impulses are either amplified or suppressed in a process called modulation. Following modulation, these signals are further projected through numerous pathways to the brain centers for processing into pain [18]. The perception and localization of pain are thought to occur at the level of the thalamus and in the sensory cortex, respectively. In theory, pain refers to a centralized experience resulting from nociception in the peripheral nerves [19]. The pain pathway is essentially complex and striking in the sense that there exist several junctures for intrinsic and extrinsic factors to control the nature, amplitude, location, and duration of original sensory signal [18]. As a result, pain memory is influenced by many factors including the intensity of painful events, environment, expectation of pain, and behavioral pattern of the patient [20]. The nervous system is known to be neuroplastic [20] or neuro-pliable. This denotes the change or adaptation of the biochemical and physiological functions of the nervous system in response to a stimulus [20]. The implication of this phenomenon is that response exhibited by the nervous system can be modified by an external or internal stimulus. The disadvantage of this action of the nervous system is that it could complicate the diagnosis and alleviation of pain [18]. Thus, pain is a complex neurophysiological process which can be modulated, amplified, and interrupted.

### **2.2 Classification of pain**

There is no one unified classification of pain. Rather, there is heterogeneity in the reports classifying pain in the literature. According to Gaynor and Muir [20], it is classified based on disease such as arthritis, pancreatitis, or cancer pain; anatomy



**Figure 1.** A flowchart showing the pathway of pain from the point of tissue insult to perception of pain.

such as bladder, pancreatic, back, or orthopedic pain; location as in superficial, visceral, or deep pain; duration including transient, acute, or chronic pain; intensity such as mild, moderate, or severe pain; and finally, based on the response to manipulation. Pain was also classified according to the duration into acute and chronic pain [21–23] and by origin into nociceptive, pathologic, and neuropathic pain [21, 20].

Acute and chronic pain appear to be the most widely studied by researchers. Fox [24] defined acute pain as “a symptom of disease” which lasts for less than 3 months. Acute pain is said to result from injury to the body which may be self-limiting and disappears with healing [20]. Ideally, acute pain refers to pain of short duration, while chronic pain denotes pain of long duration. In practice, however, there is no clear-cut distinction between the end of acute pain and the commencement of chronic pain. It is indeed difficult to pinpoint when an acute phase of pain

transcends into a chronic phase. This does not mean that every acute pain phase will gradually become chronic. However, in the absence of effective pain intervention and inability to self-limit acute pain, it is expected to assume this course.

### **2.3 Pain management**

Pain is managed using pharmacological and non-pharmacological means. Pharmacological agents used in the management of pain include opioids, non-steroidal anti-inflammatory drugs, steroidal anti-inflammatory drugs, and local anesthetics [25]. Additionally, tranquilizers, corticosteroids, tricyclic antidepressants and antiepileptic medications (topical capsaicin, mexiletine, and N-methyl-d-aspartate receptor antagonists), serotonin norepinephrine reuptake inhibitors, calcium channel  $\alpha_2$ - $\delta$  ligands, topicals, anticonvulsants, and transdermal substances are included in the pain management regimen as adjuvants to analgesics depending on the type and severity of pain [26–29]. Non-pharmacological management of pain involves the use of suitable housing, bed rest, gentle handling and manipulation (massage, osteopathic and chiropractic), meditative movements (such as Tai Chi and yoga), and diets [30, 31]. Much recent strategies for non-pharmacological pain management were classified into sensory (massage, positioning, acupuncture, hot and cold treatment, progressive muscle relaxation, and transcutaneous electrical nerve stimulation), psychological interventions, and others including music, belief, and spirituality [31, 32]. These non-pharmacological means are thought to play a huge role in relieving postsurgical pain.

## **3. Challenges to effective pharmacological pain management**

The challenges militating against effective pharmacological pain management strategy are categorized into five, including pain recognition and quantification error, patient factor, practitioner factor, drug factor, and gap between scientific evidence and clinical applications.

### **3.1 Pain recognition and quantification error**

Critical to successful pain intervention is the ability to accurately recognize and quantify pain. Pain is often not given due recognition, underreported and undetected, especially in the nonverbal and patients with communication difficulties or cognitive impairment [33, 34]. In patients who can verbally communicate, pain recognition and quantification rely on the judgment of these individuals in addition to the physiological indicators of pain. On the other hand, the accurate recognition and quantification of pain in nonverbal or cognitively impaired patients is dependent on the practitioner or care provider. Some patients with communication difficulties as seen in intensive care units (ICUs) relay pain using other cues such as signaling with eyes, leg movements, guarding of painful region, and making physical contacts with the practitioner [35]. Hence, these behaviors were incorporated into pain scales for ICU patients under sedation [35]. Practitioners have also employed the use of surrogates and analgesic trials to assess pain [36]. Hence, the successful recognition of pain in these instances lies on the expertise of the practitioner. Additionally, pain recognition and quantification error could result from the patient's inability to express pain even after experiencing a potential painful episode, or from patient not displaying consistent signs of pain.

### **3.2 Patient factor**

There are differences in patients' responses to pain and pain management strategies, thus, necessitating the need to understand the peculiarity of each patient experiencing pain. Proper examination of patient history and adequate knowledge of patient information are vital when considering the choice of pain management regimen. Several studies have reported demographics such as age [37–40], sex [38, 41, 40], and cultural differences including ethnicity [39–40, 42–43] in response to pain and these should be borne in mind. Additionally, the patient's response to pain is influenced by previous pain experience [44], nature of injury [37, 38, 45], and presence of underlying conditions which cause sensory impairment or communication difficulties [46]. These potentially complicate pharmacological pain management strategies. Therefore, understanding and treating each patient as unique is crucial for a successful alleviation of pain.

### **3.3 Personnel factor**

Adequate understanding of pain, its physiology, myths and misconceptions, ethics, recognition, and quantification and management is essential for every pain management personnel. While this is obviously the standard, information in the literature revealed that there are extensive knowledge deficits among most pain practitioners and care providers [47–51]. In hospital settings, provision of pain management relies on trained nurses often following physician's prescriptions [49]. In nonhospital settings such as residential care homes and patients' homes, pain management is performed by the patient or a caregiver in case of morbidity and cognitive impairment. In all these instances, proper knowledge of the pharmacologic agent, its mode of action, duration of the effect, recommended dose, and adverse effects are very important but hardly achieved. Several studies have demonstrated poor pain management strategy practiced by nurses [47–51], which was attributed to education deficit, errors in pain assessment, and side effects of opioids [47].

### **3.4 Drug factor**

The choice of a pharmacologic agent for pain management is influenced by its efficacy and cost, patient response, and practitioner's preference. Different classes of drugs are often combined to maximize pain alleviation. For instance, effective pain management is dependent on the choice of drug, its efficacy, dose, administration technique, adverse effects, time, and consistency of intervention. Pain management is often ineffective because of misuse errors resulting from underdosage, poor administration technique, and inconsistency in timing of administration.

To minimize the complications resulting from the use of a sole analgesic and to achieve balanced analgesia, different classes of agents are combined in a multi-modal fashion [52–54]. Though complex, cited advantages include effective and efficient analgesia, and possibly, reduction in doses of one or more individual drugs [54]. However, if misused, they can hinder the effectiveness of analgesics and thus constitute a barrier to effective pain management.

### **3.5 Gap between scientific evidence and clinical applications**

Even though there exist many scientifically proven analgesic regimens for pain mitigation in the literature [55], effective pain management has not been adequately achieved across treatment settings. It does appear that these evidence-based recommendations are not properly incorporated in clinical practice, thus,

presenting an obvious aperture between these scientific recommendations on pain management strategies and applications in treatment settings. Supporting this claim is the study of Bennetts et al. [56] which demonstrated that the staff of the Australian emergency departments recognized the gap between recommendations and everyday practice-based pain as a barrier to effective pain management. Additionally, the report of Glajchen [57] underscored knowledge gaps as clinician's barrier to effective pain relief. This paucity in the incorporation of evidence-based findings in actual practice may be driven by lack of awareness and knowledge deficits on scientifically proven optimal pain management regimens which are constantly evolving [56, 57], hence, the need to be up-to-date. Therefore, regular training of practitioners through continued education programs and dissemination of current scientific findings in a convenient user-friendly format may help militate this challenge.

Furthermore, the lack of incorporation of scientific findings in treatment settings may also be due to the existence of abundant low-quality scientific evidence which does not meet the required standard to be incorporated into clinical guidelines for pain management [58]. This observation supports the need for high-quality research using refined methods, randomized trials, and efficient research-collaborations. Thus, this has implications for future research.

#### **4. Conclusion**

In conclusion, effective pain management is possible, though, challenges resulting from pain recognition and quantification, patients, practitioners, drugs, and gap between scientific evidence and practical applications need to be taken into proper consideration. Knowing and understanding the peculiarity of each patient would help to control the patient-induced challenges, continuous education or training of practitioners and care providers on pain recognition, and quantification methods would not only eliminate the practitioner-related challenges but will also address pain recognition and quantification errors, and possibly, bridge the gap between scientific evidence and clinical usage. Additionally, the improvement in current research methods and the incorporation of high-quality scientific evidence will also bridge the gap between research and practice. Finally, proper knowledge of pharmacology and the use of evidence-based analgesics in recommended doses and combinations will help overcome the drug-related challenges. Therefore, future research should aim at investigating the effectiveness of these recommendations.

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